

NGT

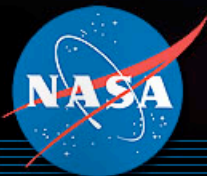
NEXT GENERATION LAUNCH TECHNOLOGY

Integrated Space Transportation Plan



Steve Cook
Deputy Program Manager

SAFE
RELIABLE
AFFORDABLE



***As the NASA's Investment in Space Launch
Technology, NGLT is:***

**Enabling NASA to Greatly Expand the Scientific and Human
Exploration of Space**

**Enabling the U.S. to Regain Commercial Launch Vehicle Market
Share and to Open New Markets**

Supporting our Country's National Security Needs

Promoting a Healthy Aerospace Workforce

- Reinvigorating Aerospace Industry R&D
- Reenergizing Engineering & Science Education

..... As Only NASA Can

High Leverage, Cross-Cutting Technologies for Any Future Launch System



Cutting Edge Hypersonics Technologies for Future, Aircraft-like Operations



**Long Life, High
Temperature
Structures and
Materials**



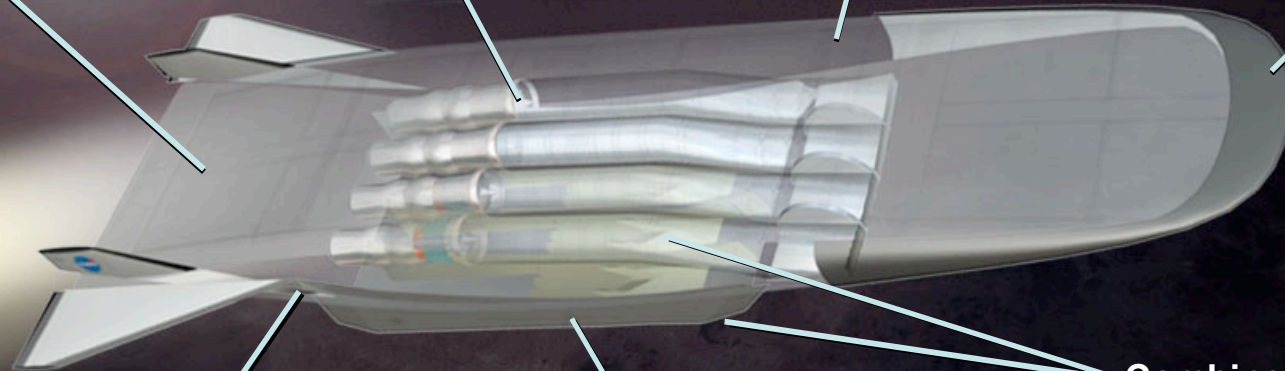
**Mach 4 Turbine
Engines**



**Highly Integrated
Airframe Systems**



**Ultra High-Temp
Leading Edges**



**Integrated
Rockets**

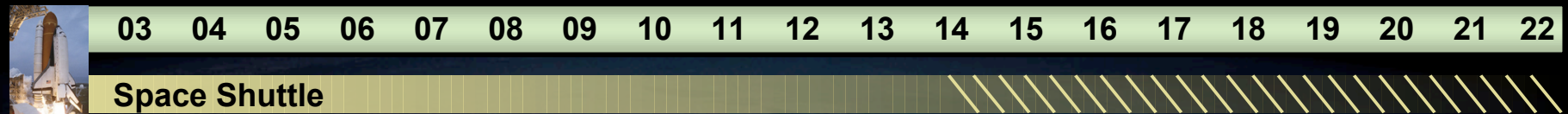


Ram / Scramjets



**Combined Cycle
Propulsion
Systems**

Enabling Near and Long Term Improvements in U.S. Launch

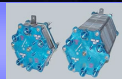


Expendable Launch Vehicles

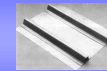
OSP

OSP
Crew Return

OSP
Crew Transfer



Technology Program



1st
Flight

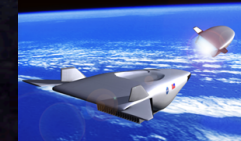
Risk Reduction

Development

Operations

NGLT Program

Decision Point



1st
Flight

Risk Reduction

Development

Near Term Options

- Shuttle Upgrades / Derived System
- New Rocket RLV (potentially with DoD)
- Heavy Lift Expendable Launch

Longer Term Options

- New Rocket RLV
- Hypersonic RLV
- Very Heavy Lift Launch



NGLT Partners





Enabling “Firsts” in U.S. Space Launch Technology

Booster Engine Prototype



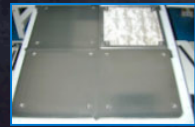
Highly reliable hydrocarbon fueled rocket booster engine
(1+ Million lb thrust) – 1st in 40 years
High reliability, long life rocket turbopumps

Auxiliary Propulsion



Non-toxic propellants for orbital propulsion

Vehicle Research and Technology



Airframes capable of containing cryogenic propellants and
reentering the Earth’s atmosphere
Durable high temperature thermal protection systems
An intelligent, autonomous “all electric” launch system

Propulsion Research & Technology



Long life, lightweight high temperature materials, seals and
components

X-43A and C



1st controlled flight of a vehicle powered by an engine with
no rotating parts (scramjet) from Mach 5 - 7 and 10

Revolutionary Turbine Accelerator



Lightweight, long life jet engines capable of flight at 4 times
the speed of sound

Rocket Based Combined Cycle



Engines capable of both airbreathing (scramjet) and rocket
propulsion in one system



Measuring Our Progress



Booster Engine Prototype

Demonstrator turbopumps completed. Single injector testing complete. Demonstration of long life combustion liner

40K preburner and thrust chamber assembly and turbine inducer testing. Advanced valve demonstration

Complete prototype preliminary design and component and subsystem testing. Award of fabrication contract



Auxiliary Propulsion

Completed test firings of LOx/Ethanol rocket

Initiate peroxide testing and completion of testbed design

Complete the design of 2 competing engines

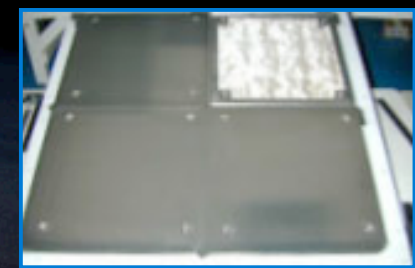


Propulsion R&T

Fabricated 5 competing ceramic matrix composite combustor panels

Demonstrate high temperature polymer and ceramic composite materials

Award NRA. Test advanced panel in scramjet test article



Vehicle R&T

Demonstrated improved welding techniques and damage resistant thermal tile

Demonstration of durable acreage TPS, IVHM testbed and life testing on composite cryogenic tanks

Design of Mach 15 flowpath, test of advanced thermal seals, delivery of an "all electric" power/actuation testbed

2002

2003

2004

Measuring Our Progress



X-43A

Redesign
completed



X-43C

Concept Design and
System Requirements
Complete



**Revolutionary
Turbine
Accelerator**

Awarded Mach 4
demonstrator engine
contract to GE Aircraft
Engines



**Rocket Based
Combined Cycle**

Awarded Contract to Aerojet,
Pratt and Whitney,
Rocketdyne Consortium.
System Requirements
Complete

2002

2nd Flight - Mach 7

Award of Demonstrator
and Launch Vehicle
Contracts

2003

Complete Project
Readiness Review and
Definition of System
Requirements.

Complete concept design

2004

3rd Flight - Mach 10

Complete Design of the
Multimodule Flowpath
Propulsion Demonstrator

Complete design of
Mach 2.5 fan

Complete the preliminary
design of the ground test
engine

NGT
NEXT GENERATION LAUNCH TECHNOLOGY

*Safe
Reliable
Affordable*



**Think of What We Have Accomplished
in the 100 years Since the Wright
Brothers 1st Flight**



***..... Imagine What We Will Do in the
Next Century of Flight***